How a synergy of GOCART, MODIS and AERONET data can be used to train neural networks for producing global aerosol volume size distributions from space

Michael Taylor

Institute of Environmental Research and Sustainable Development,

National Observatory of Athens, Greece

Abstract

A global characterization of aerosols in the atmosphere is vital to correctly estimate their important effect on climate change. Central to this endeavour are global models of aerosol microphysics. Aerosol volume size distributions in particular are accurately monitored by ground-based instruments like AERONET sunphotometers which are located mainly in populated areas like cities. However, the most dominant sources of aerosol are from uninhabited regions like the planet's deserts and the oceans where few instruments exist. I will present some initial results from a new global aerosol model called AEROMAP (http://apcg.meteo.noa.gr/aeromap/) which harnesses the full-Earth measurement of optical depth and water vapour from the MODIS instrument as well as optical depth estimates for different aerosol types output by the GOCART model – both generously provided by Giovanni-4. Cluster analysis of GOCART data allowed for a partition of the global grid into regions of different aerosol type. For each region, a neural network was trained on synchronous MODIS and AERONET data to convert space-based aerosol measurements from MODIS to "ground-quality" AERONET size distributions, and then to extrapolate them globally on the daily timescale.